What is claimed is:

1. A multi-layer hard mask structure, comprising:

a first hard mask layer composed of a first boro-silicate glass layer and an overlying first undoped silicon glass layer; and

at least one second hard mask layer disposed on the first hard mask layer, which is composed of a second boro-silicate glass and an overlying second undoped silicon glass layer.

2. The hard mask structure as claimed in claim 1, wherein a doping concentration of the first boro-silicate glass layer is substantially equal to that of the second boro-silicate glass layer.

3. The hard mask structure as claimed in claim 2, wherein the doping concentration of the first boro-silicate glass layer is about 4×10^{17} to 8×10^{17}atom/cm^2.

4. The hard mask structure as claimed in claim 2, wherein the first boro-silicate glass layer has a thickness of about 0.3μm.

5. The hard mask structure as claimed in claim 1, wherein the first undoped silicon glass layer has a thickness of about 100 to 400Å.

6. The hard mask structure as claimed in claim 1, wherein the second undoped silicon glass layer has a thickness of about 100 to 400Å.

7. The hard mask structure as claimed in claim 1, wherein a doping concentration of the first boro-silicate glass layer is higher than that of the second boro-silicate glass layer.

8. The hard mask structure as claimed in claim 7, wherein the doping concentration of the first boro-silicate glass layer is about 4×10^{17} to 8×10^{17}atom/cm^2.

9. The hard mask structure as claimed in claim 7, wherein the doping concentration of the second boro-silicate glass layer is about 1×10^{17} to 5×10^{17}atom/cm^2.

10. A method for etching a deep trench in a substrate, comprising the steps of:

forming a multi-layer hard mask structure overlying the substrate, comprising a first hard mask layer and at least one second hard mask layer disposed thereon, wherein the first hard mask layer is composed of a first boro-silicate glass layer and an overlying first undoped silicon glass layer and the second hard mask layer is composed of a second boro-silicate glass layer and an overlying second undoped silicon glass layer;

forming a polysilicon layer overlying the multi-layer hard mask structure;

etching the polysilicon layer to form an opening therein and expose a portion of the multi-layer hard mask structure;

successively etching the multi-layer hard mask structure and the underlying substrate under the opening to simultaneously form the deep trench in the substrate and remove the polysilicon layer; and

removing the multi-layer hard mask structure.

11. The method as claimed in claim 10, further forming a pad oxide layer and an overlying silicon nitride layer between the substrate and the multi-layer hard mask structure.

12. The method as claimed in claim 10, further annealing the multi-layer hard mask structure before the polysilicon layer is formed.

13. The method as claimed in claim 12, wherein the annealing is performed at 550 to 600°C.

14. The method as claimed in claim 12, wherein the annealing is performed for 15 to 25 minutes.

15. The method as claimed in claim 10, wherein a doping concentration of the first boro-silicate glass layer is substantially equal to that of the second boro-silicate glass layer.

16. The method as claimed in claim 15, wherein the doping concentration of the first boro-silicate glass layer is about 4×10^{17} to 8×10^{17}atom/cm^2.

17. The method as claimed in claim 10, wherein the first boro-silicate glass layer has a thickness of about 0.3μm.

18. The method as claimed in claim 10, wherein the first undoped silicon glass layer has a thickness of about 100 to 400Å.

19. The method as claimed in claim 10, wherein the second undoped silicon glass layer has a thickness of about 100 to 400Å.

20. The method as claimed in claim 10, wherein a doping concentration of the first boro-silicate glass layer is higher than that of the second boro-silicate glass layer.

21. The method as claimed in claim 20, wherein the doping concentration of the first boro-silicate glass layer is about 4×10^{17} to 8×10^{17}atom/cm^2.

22. The method as claimed in claim 20, wherein the doping concentration of the second boro-silicate glass layer is about 1×10^{17} to 5×10^{17}atom/cm^2.

23. The method as claimed in claim 10, wherein the polysilicon layer has a thickness of about 0.2 to 0.3μm.